Foodborne Illness Outbreaks

Definition: An illness caused by an infection or intoxication caused by a bacterial, viral, parasitic or chemical agent transmitted by a food. This definition includes primarily outbreaks (two or more cases from a common source, except for chemical or botulism cases) but data on single cases of enteric pathogens which are predominantly foodborne are also included (*Salmonella spp., Campylobacter spp.* and *E.coli O157:H7).*

Summary

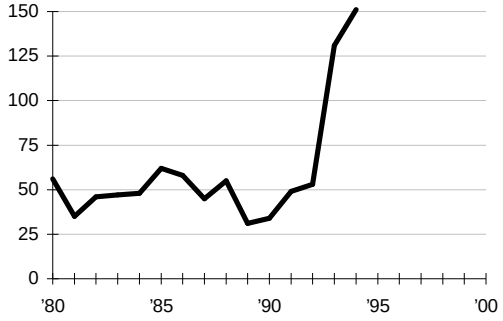
Reported outbreaks of foodborne illness in Washington were relatively stable, averaging about 50 per year from 1980 through 1992, then more than doubled in 1993 and tripled in 1994. The increased reporting probably has resulted from increased public awareness due to a much-publicized *E.coli O157:H7* outbreak in the Northwest in 1993.

The true number of food related illnesses in this state has been estimated to be in the range of 120,000 to 1,980,000 cases, with 10-60 deaths annually and annual costs ranging from $96 million to $460 million. [1] The causes of most foodborne illnesses are well understood and most are preventable through proper food handling techniques. [2]

Time Trends

Reported foodborne illness outbreaks remained fairly constant in the range of 30-60 outbreaks annually from 1980 to 1992. During 1993 and 1994, there was a marked increase in reported outbreaks of foodborne illness, with numbers more than doubling in 1993 to 131 and tripling in 1994 to 151. This trend appears to have continued in 1995. Probably this increase in reported outbreaks is not indicative of more cases of disease but rather increased awareness among the public and health care providers of the need to report possible foodborne illness cases and outbreaks to local health agencies for investigation. National data on foodborne illness are inadequate, with the most recent published summary covering the years 1983-1987.[3] Recent trend data are unavailable nationally.

Number of Foodborne Illness Outbreaks in Washington



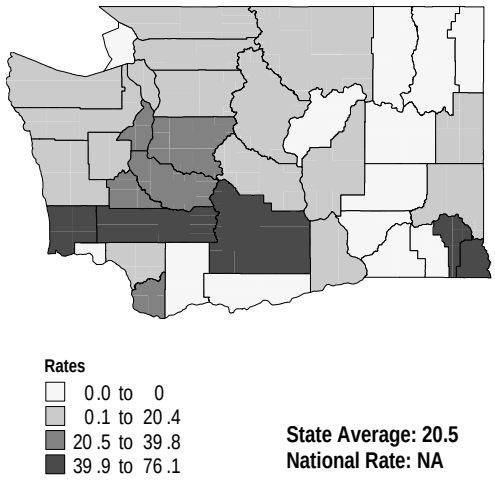
Year 2000 Goal

Washington's goals for the year 2000 relate to the case rates per 100,000 for illness from three predominantly foodborne bacterial pathogens:

	Goal (Cases per 100,000)	
	Wash.	US
Salmonella	8.9	16
Campylobacter	15.5	25
E. coli	3.4	4

While not every case of illness from these three types of bacteria is related to food, the Centers for Disease Control and Prevention (CDC) estimates that at least 90% are food-related.

Foodborne Disease
Outbreak-Related Cases Per 100,000 People, 1990-1993



Meeting these state goals may be difficult. The effects of increased reporting may make the problem appear to be increasing even as reductions in real numbers of illness occur. The effects of emerging diseases and changes in global food production may also affect reported cases of illness.[4]

There are two other state goals regarding shellfish that will require great effort to meet. The first is to minimize pollution-related illness from shellfish by establishing community-based efforts to prevent shellfish growing area downgrades. The second is to improve water quality sufficiently to lift harvest restrictions in at least one shellfish harvest area each year. These are ambitious goals since 19 areas have been downgraded by pollution since 1981 by DOH but only 10 areas have been upgraded during the same period.

Geographic Variation

Foodborne disease outbreak case rate data for the years 1990-1993 are summarized in the map on the preceding page. These data show cases from reported outbreaks per 100,000 people. The counties with the highest average annual reported foodborne illness rates from outbreaks were: Garfield (76.1), Asotin (61.8), Lewis (55.0), Pacific (49.5) and Yakima (45.0). The statewide average was 20.5 outbreak-related cases per 100,000 per year. Note that some of these rates are high due to small population size in a county.

Age and Gender

Gender does not seem to be important in the epidemiology of foodborne disease. All people are susceptible to illnesses caused by foodborne agents. Differences in diets between men and women sometimes may predispose certain groups to disease.

Age is much more important in the epidemiology of foodborne disease. Young children (less than 10 years) are most susceptible to many enteric bacterial pathogens such as campylobacter, E. coli, and salmonella. In addition, severe illness leading to hospitalization or death is more likely to occur in the young and the elderly.

Race and Ethnicity

In 1993, Hispanics, Blacks and Asians had higher rates of salmonellosis than the whole population of the state. However, in 1994 only Hispanics continued to have a higher incidence. In 1993, only Hispanics had a higher incidence of campylobateriosis than the statewide average. While in 1994, both Hispanics and American Indians experienced higher rates. Some of this increased risk may be associated with the consumption of cheese made from unpasteurized milk, which is a common ethnic delicacy for Hispanics.

Other Measures of Impact and Burden

Estimated numbers and costs. Real numbers and costs of foodborne illness are very difficult to estimate. Reported outbreaks and cases of foodborne illness are greatly under-reported. Three recent attempts have been made to estimate true numbers and economic impacts of foodborne disease.[5 6 7] Extrapolating these numbers to Washington suggests that 120,000 to 1,980,000 cases of foodborne illness occur each year with from 10 to 60 deaths. Estimated costs associated with these cases range from $96,000,000 to $460,000,000 annually. These estimates were made without considering the impact of *E.coli* O157:H7.

Quality of Life. The public perceives foodborne disease to be an upset stomach and some diarrhea which lasts a few days, mostly an inconvenience, without long-lasting effects. The reality is that sometimes foodborne disease may cause very severe illness, even death, and survivors may be affected for the rest of their lives. During 1994, eight large outbreaks of salmonella occurred in Washington. One unexpected result was the development in previously healthy adults of severe reactive arthritis in the major joints of the body after they had recovered from the gastroenteric symptoms. The CDC is currently studying these severe complications following salmonella infections.

Hepatitis A is also on the increase again after declining from record high levels in 1989 (see related section on hepatitis A). Most cases are not related to commercial food establishments. Many are a result of contaminated foods at home. Hepatitis A often is quite debilitating, resulting in weeks of lost productivity. Young adults have the highest incidence of reported illness.

Shellfish. Washington State produces more molluscan shellfish than any other state. Pollution

of growing areas for shellfish resulted in illnesses in consumers during 1994. Since 1981, DOH has downgraded the classification of 19 shellfish growing areas, totaling 45,030 acres, and upgraded 10 areas, involving 24,030 acres. Loss of acceptable growing area has a negative effect on production, increasing costs and possibly affecting consumer confidence in the safety of shellfish.

Another concern is natural phytoplankton biotoxins which can affect shellfish. Both paralytic shellfish poison (PSP) and domoic acid occur here, and cases of illness have resulted from consumption of contaminated shellfish. Annual costs of monitoring for these biotoxins to prevent illness exceed $300,000.

Risk and Protective Factors

Factors relating to outbreaks of foodborne disease have been studied nationally, in Washington, and other states. The table below shows the principal known factors relating to foodborne illness in Washington from 1990 through 1993 and the percent of outbreaks in which they were identified:

Improper cooling/refrigeration	47%
Poor personal hygiene/hand washing	30%
Cross-contamination	29%
Inadequate hot-holding	27%
Ill or infected food handler	12%
Inadequate reheating	10%
Inadequate cooking	10%

These figures add to over 100 percent because two or more factors may be present in a single outbreak.

High Risk Groups

Several groups of people are at increased risk of contracting a foodborne illness and becoming severely ill or dying from it.

The Young. Young children are at higher risk because their natural body defenses are not fully formed. Their bodies are smaller, so fewer organisms cause illness. They are more likely to become severely ill, requiring hospitalization and expensive treatment. The 1993 *E.coli* O157:H7 outbreak showed the devastating effects foodborne illness can have on young children. In 1994, children age 1-4 had an incidence rate for *E.coli* 0157:H7, nearly 4 times the statewide rate for all ages.

The Elderly. Older people may be more severely affected by foodborne illness than younger people. As we age, our natural defenses to diseases begin to diminish. Sometimes other debilitating chronic diseases such as heart disease or diabetes affect our strength and our ability to recover from the effects of foodborne illness.[8]

The Immuno-compromised. As more people undergo cancer chemotherapy, have organ transplants, and develop diabetes or HIV infections, the numbers of people with diminished immunity are increasing. The severity of foodborne illnesses in immuno-compromised persons can be much greater. In 1993, there were 21 cases of listeriosis in Washington and two deaths. Listeriosis occurs primarily in people with lessened immunity, and the fatality rate is typically about 50%. It is caused by contaminated food sources. The same concerns exist about *Vibrio* infections from raw shellfish consumption in this group. Individuals with intact immunity do not ordinarily develop one type of Vibrio infection, *Vibrio Vulnificus.*

Intervention Points, Strategies and Effectiveness

The principle methods of preventing and controlling foodborne illness are:

- Education of the public, food handlers, and food managers about food safety.
- Maintaining local and state health department capacity to carry out epidemiologic investigation of foodborne diseases.
- Development of food safety regulations.
- Inspection and surveillance to enforce regulations.
- Communication with other food safety agencies to avoid gaps or overlaps and to foster cooperation on food safety issues.
- Emergency response to food safety emergencies caused by floods, power outages, food product recalls, and tampering incidents.

Measurement of the effectiveness of some of these strategies has not been completed. However, there are reports on the effectiveness of management certification and inspection programs.[9] During the 1993 *E.coli* O157:H7

outbreak in the northwest, rapid public health action by local and state health agencies resulted in the removal of 250,000 potentially contaminated hamburgers, preventing an estimated 800 cases of disease and four deaths.[10]

Data Sources

State Annual Communicable Disease Report 1994

State Morbidity and Mortality Summary 1993, 1992, 1991, 1990

For More Information

Food Safety in Washington, Issues and Recommendations, September 1994; A Report from the Food Safety Enhancement Advisory Committee. Washington State DOH and WSDA.

Endnotes:

[1] "Changing Epidemiology of Food-Borne Disease: A Minnesota Perspective" C.W. Hedberg, K.L. MacDonald, M.T. Osterholm; Clinical Infectious Diseases; 1994; 18:671-82.

"Preliminary Estimates of Costs of Foodborne Disease in the United States"; Evan C.D. Todd; 1989; J. Food Protection; 52(8):595-601.

"Estimates of Incidence and Costs of Intestinal Infectious Diseases in the United States" Wallace E. Garthright, D.L. Archer, J.E. Kuenberg; 1988; Public Health Reports; 103(2):107-115.

[2] "Use of Foodborne Disease Data for HACCP Risk Assessment" Steven E. Weingold, J.J. Guzewich and J.K. Fudala; 1994; J. Food Protection; 57(g):820-30.

[3] "Foodborne Disease Outbreaks, 5-Year Summar, 1983-1987" Nancy H. Bean, P.M. Griffin, J.S. Goulding and C.B. Ivey; 1990; J. Food Protection; 53(8): 711-728.

[4] "Changing Epidemiology of Food-Borne Disease: A Minnesota Perspective" C.W. Hedberg, K.L. MacDonald, M.T. Osterholm; Clinical Infectious Diseases; 1994; 18:671-82.

[5] "Preliminary Estimates of Costs of Foodborne Disease in the United States"; Evan C.D. Todd; 1989; J. Food Protection; 52(8):595-601.

[6] "Estimates of Incidence and Costs of Intestinal Infectious Diseases in the United States" Wallace E. Garthright, D.L. Archer, J.E. Kuenberg; 1988; Public Health Reports; 103(2):107-115.

[7] "Human Illness Costs of Foodborne Bacteria"; Tanya Roberts; 1989; American Journal of Agricultural Economics; 71(2):468-473.

[8] "Educational Programs to Reduce Foodborne Illness for High-Risk Individuals" University of Florida, Institute of Food and Agriculture, 1995.

" The Emergence of Grade A Eggs as a Major Source of Salmonella enteritidis Infections" Michael St. Louis, D. Morse et al JAMA April 8, 1988, 259 (14)2103-07.

[9] "Results of Routine Restaurant Inspections Can Predict Outbreaks of Foodborne Illness: The Seattle-King County Experience" Kathleen Irwin, J. Ballard et. al. AJPH, May 1989, 79 (5), 586-90.

"National Standard for Unit Manager Food Safety Knowledge", Conference for Food Protection 1992 Training, Testing and Certification Committee Report.

[10] "A Multistate Outbreak of Escherichia coli O157:H7-Associated Blood Diarrhea and Hemolytic Uremic Syndrome from Hamburgers" Beth P. Bell, M. Goldoft, et al; 1994; J.A.M.A. 272(17):1349-53.